

CLAIMS:

1. A catheter for a medical apparatus comprising:
an inner catheter (100) having a distal end and a proximal end; and
a sheath (202) of polymer material, having a distal end and a proximal end, disposed around at least a portion of the inner catheter, said sheath being retractable in a proximal direction relative to the inner catheter to perform an actuating step at the distal end of the system, by the application of an endwise tensile stress to the proximal end of the sheath,
characterized in that:
the inner catheter resists the associated radially-inward contraction of the sheath which arises from the applied tensile stress during said actuating step.
2. Catheter as claimed in claim 1 and including a lubricious coating (132) on the outer surface of the inner catheter.
3. Catheter as claimed in claim 1 or 2, with a lubricious fluid (132) in the annulus between the sheath and the inner catheter.
4. Catheter as claimed in any one of the preceding claims, wherein the sheath is made from a thermoplastic elastomeric material.
5. Catheter of any preceding claim, wherein the inner catheter comprises:
a wire coil (110) having a lumen, a distal end, a proximal end, a distal region (114), an intermediate region and a proximal region (112); and
an outer tube (124) disposed around at least a portion of the wire coil, having a distal end and a proximal end.

6. Catheter of claim 5, in which the inner catheter includes an inner tube (102) radially within the wire coil lumen
7. Catheter of claim 6, wherein the distal end of the inner tube extends to a point distal of the distal end of the wire coil.
8. Catheter as claimed in claim 6 or 7, wherein the inner tube defines an inner lumen (104) for the insertion and retraction of a guide-wire therethrough.
9. Catheter as claimed in any one of claims 5 to 8, wherein the wire coil has a closed-coil structure in the intermediate region and an open-coil structure in at least one of the distal region and the proximal region.
10. Catheter of claim 9, wherein the wire coil has an open-coil structure in both the distal region and the proximal region.
11. Catheter as claimed in any one of claims 5 to 10, in which the wire coil defines a liquid flow path from the proximal end to the distal end of the system which includes a radially-extending portion through said open coil structure, for transferring liquid from the proximal end to the distal end of the coil.
12. Catheter as claimed in claim 11, wherein the liquid flow path is an annular flow path bounded inside by the inner tube and outside by the wire coil, for transferring liquid from the proximal end to the distal end of the coil.
13. Catheter as claimed in any one of claims 5 to 12 wherein the outer tube is a shrink-tube constraining the wire coil.
14. Catheter as claimed in claim 13, wherein the outer tube is made from PTFE.

15. Catheter as claimed in any one of claims 5 to 14, wherein the inner tube defines a medical-device-receiving annulus around a distal portion of the inner tube, said distal region being distal of the distal end of the wire coil and proximal of the distal end of the inner tube.

16. Catheter of any preceding claim, and having an atraumatic tapered tip (106) at the distal end of said system.

17. Catheter of claim 16, wherein the tip is formed as part of the sheath.

18. Catheter of claim 16, wherein the tip is attached to the inner catheter.

19. Catheter of claim 18, wherein the tip is made from a polyurethane.

20. A medical-device-delivery apparatus, having a distal end and a proximal end, comprising:

a catheter as claimed in any one of claims 5 to 19; actuating means (150, 250) connected to the inner catheter and to the sheath for retracting the sheath in a proximal direction relative to the inner catheter.

21. The medical-device-delivery apparatus of claim 20, and carrying a medical device (300) for deployment in a bodily lumen, the medical device being maintained in position between the sheath and the inner catheter, and the medical device being releasable by a retraction of the sheath in a proximal direction relative to the inner catheter.

22. The medical-device-delivery apparatus of claim 21, wherein:

the medical device is held within the lumen of the outer sheath at a location distal of the distal end of the wire coil;

the medical device is maintained radially compressed in a first state by the sheath being disposed around at least a portion of the medical device;

during retraction of the sheath, the medical device is prevented by the wire coil from moving with the sheath in a proximal direction; and

when the sheath is retracted in a proximal direction relative to the inner catheter, the medical device is released for expansion to a radially less compressed state.

23. The medical-device-delivery apparatus of claim 21 or 22, wherein the medical device is a self-expanding stent.